

Progression of Space Transportation

Transitioning from Government to Commercial

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Enabling Commercial Space

- When spaceflight began over 50 years ago, it was the exclusive province of government
- In the 1980's the U.S. Administration began a push for opening commercial access to space
- National Space Policy – 1982
 - “The United States encourages domestic commercial exploration of space capabilities, technology, and systems for national economic benefit.”
- This policy included direction for the Space Shuttle to be used as a means to transport commercial payloads
 - “The United States Space Transportation System (STS) is the primary space launch system for both national security and civil government missions. STS capabilities and capacities shall be developed to meet appropriate national needs and shall be available to authorized users -- domestic and foreign, commercial, and governmental”
- Over the next several years the United States consider various alternatives for totally commercializing the Space Shuttle

Legal Framework

- Commercial Space Launch Act of 1984
 - Encourage, facilitate, and promote commercial space launches by the private sector
 - Establish regulatory authority within the Department of Transportation
 - Provide of the issuance of permits and commercial licenses authorizing the conduct of commercial launch and re-entry operations
- Proposed Commercial Spaceflight Legislation
 - Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015
 - Commercial Space Launch Competitiveness Act

NASA's Contribution

- NASA Need
 - Cargo
 - Deliver pressurized and upressurized cargo to the International Space Station
 - Return and recover cargo from station
 - Dispose refuse material from station
 - Crew
 - Deliver four crew and pressurized cargo to and from the station
 - Provide safe haven and lifeboat capability in case on on-orbit emergency

NASA's Contribution

- NASA's Role
 - Initiate the government market for space transportation services, acting as the anchor tenant or base to leverage off of.
 - Support development of non-NASA markets for commercial human transportation to and from low-Earth orbit

NASA'S Implementation

- High Level Requirements
 - Focus on function and performance
 - Allow for alternate approaches
- Balance government and industry needs
 - Firm, fixed-price contracts
 - High degree of cost certainty
 - Minimize administrative overhead
 - Industry retention of intellectual property rights
 - Flexibility to apply commercial practices and innovative solutions
- Collaborative Partnerships
 - Launch Services Program
 - Federal Aviation Administration
 - Department of Defense/U.S. Air Force

Sharing NASA'S Assets

- Facilities
 - Launch Complex 39A
 - Orbiter Processing Facility-3
 - Processing Control Center
- Capabilities
 - Mission Control Center
 - Neutral Buoyancy Lab
 - Wind Tunnels
 - Hydro Impact Basin
 - Independent Verification and Validation (IV&V)
 - Test Stands

NASA's Continuing Initiatives

- International Space Station National Laboratory
 - Center for the Advancement of Science in Space (CASIS)
 - Facilitates access to station for researches and businesses
 - Remote sensing, physical and material sciences, biosciences
 - Protection for intellectual property
- Collaborations for Commercial Space Capabilities (CCSC)
 - Advance private sector development of integrated space capabilities through access to NASA's spaceflight resources
 - Ensure emerging products or services are commercially available to government and non-government customers within approximately the next five years
- Lunar CATALYST
 - Encourage the development of robotic lunar landers that can be integrated with U.S. commercial launch capabilities to deliver payloads to the lunar surface.

Regulatory Framework

- Federal Aviation Administration (FAA)
 - Regulates the U.S. commercial space transportation industry
 - Ensure compliance with international obligations of the United States
 - Protect the public health and safety
 - Provides Launch & Re-entry licensing, as well as site Launch & Re-entry operator licensing
 - Experimental Permits for reusable suborbital rockets
 - Inspection and Compliance Monitoring
 - Investigation and Enforcement

Regulatory Framework

- Regulatory Challenges
 - Liability
 - Cross Waivers
 - Financial Responsibility
 - Third party indemnification
 - Government Property
 - Informed Consent
 - Legislative proposals to include a new category of spaceflight occupants “Government Astronaut”
 - Engaging the full range regulators and independent agencies
 - Federal Communications Commission (FCC)
 - National Telecommunications and Information Administration (NTIA)
 - National Transportation and Safety Board (NTSB)

SUMMARY

- The first 25 of spaceflight belonged to exclusively to governments to develop, own, and operate systems
- We are in the transitory phase of opening up space transportation to commercial service providers
- In the next 10 years, we are looking for regulatory framework to support Low-Earth orbit markets
- If we are successful, in the next 25 years services will be fully commercially available, opening space access for all
- This allows NASA to buy services, explore and spur potential initiatives